

Phase-sensitive near-field investigation unravels optical Bloch modes in photonic crystal waveguides

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Light propagating in a photonic crystal waveguide is measured with a phase-sensitive near-field scanning optical microscope. Due to the periodicity of the waveguide, Bloch waves are observed. The phase-sensitive measurements allow the construction of the local photonic band structure. Multiple Brillouin zones are observed, related to the many spatial frequencies that make up a single Bloch mode. We show

that the spatial amplitude distribution of each harmonic of the same Bloch mode is different. In this way we unravel the complex nature of the composite Bloch mode.

